consider the CRAWLSPACE

BEST PRACTICES

Though homeowners rarely think about that small space under their houses, builders should give crawlspaces careful consideration. Some of the most common—and damaging—building problems stem from moisture in crawlspaces. Poorly constructed crawlspaces can contribute to mold problems, indoor air problems, and inefficient operation of the home's mechanical equipment. Carefully considering design and construction of crawlspaces, as part of an overall quality construction strategy, can reduce problems for both builders and homeowners.

Preventing Moist Crawlspaces. Moist crawlspaces can contribute to rot, mold, and fungus growth, which can damage wood floor joists and beams. Furthermore, moisture in crawlspaces can lead to health problems associated with mold, mildew, and bacterial growth. A carefully engineered moisture management strategy should be implemented to control moisture in crawlspaces. These key preventative steps are part of such a strategy:

- Install a continuous and sealed high quality 6 mil polyethylene vapor retarder on the ground in the crawlspace and protect it with a concrete scratch coat.
- Mimimize moisture during the construction process.
- Create an external sloping grade so that rain water flows away from the crawlspace.
- Install a foundation wall system that does not leak.
- Install rain gutters, extensions, and leaders to carry excess water away from the home.
- Provide a capillary break on top of footer.
- Install a footing drainage system to prevent rising groundwater from flooding the crawlspace.
- Bring conditioned air into the crawlspace.
- Insulate the exterior surface of the crawlspace wall.
- Seal the crawlspace against air leakage.

Benefits of Unvented Crawlspaces. Crawlspace vents effectively become the "determined hole" in a home. In winter, warm air exiting the attic or ceiling creates a negative pressure at the lowest openings in the home. This negative pressure causes cold air to enter through the crawlspace vents and rise through holes in the subfloor to the first floor. This phenomenon creates the "cold floor syndrome" prevalent in cold climate homes with vented crawlspaces. The cold air can also carry unwanted moisture and gases from the soil, and odors from the crawlspace into the home.

Typically, the floor above a vented crawlspace is insulated. In unvented crawlspaces, the walls, instead of the floor, should be insulated to limit heat transfer from outside to inside the crawlspace, and vice versa. When properly built, an unvented, insulated crawlspace helps to eliminate problems with comfort, odor, and health associated with mold, mildew, and bacterial growth.

However, unvented crawlspaces aren't recommended in certain locations. For example, a warm crawlspace in an extremely cold climate may eventually melt the perma-frost beneath the home, allowing the home to sink into the ground. Also, when homes are built in high water table areas (near rivers at the bottom of steep valleys, for example), it can be useful to seasonally vent the crawlspace to allow for drying after flooding.

Conditioning the Crawlspace. Once the crawlspace is insulated and unvented, it should be treated the same way as any other space in the house—supplied with a certain amount of heated or cooled air from the mechanical system. Conditioning the crawlspace can help the mechanical components that are housed in the crawlspace (the air handler, ductwork for the first floor zone, and plumbing line, for example) operate more efficiently and last longer because they are not subject to temperature and humidity extremes. Ideally, the crawlspace temperature should be about 55°F to 65°F year-round. All ducts should be well sealed with mastic to prevent unwanted air leakage. This air leakage increases energy consumption because the outside air has to be heated in the winter and cooled in the summer.

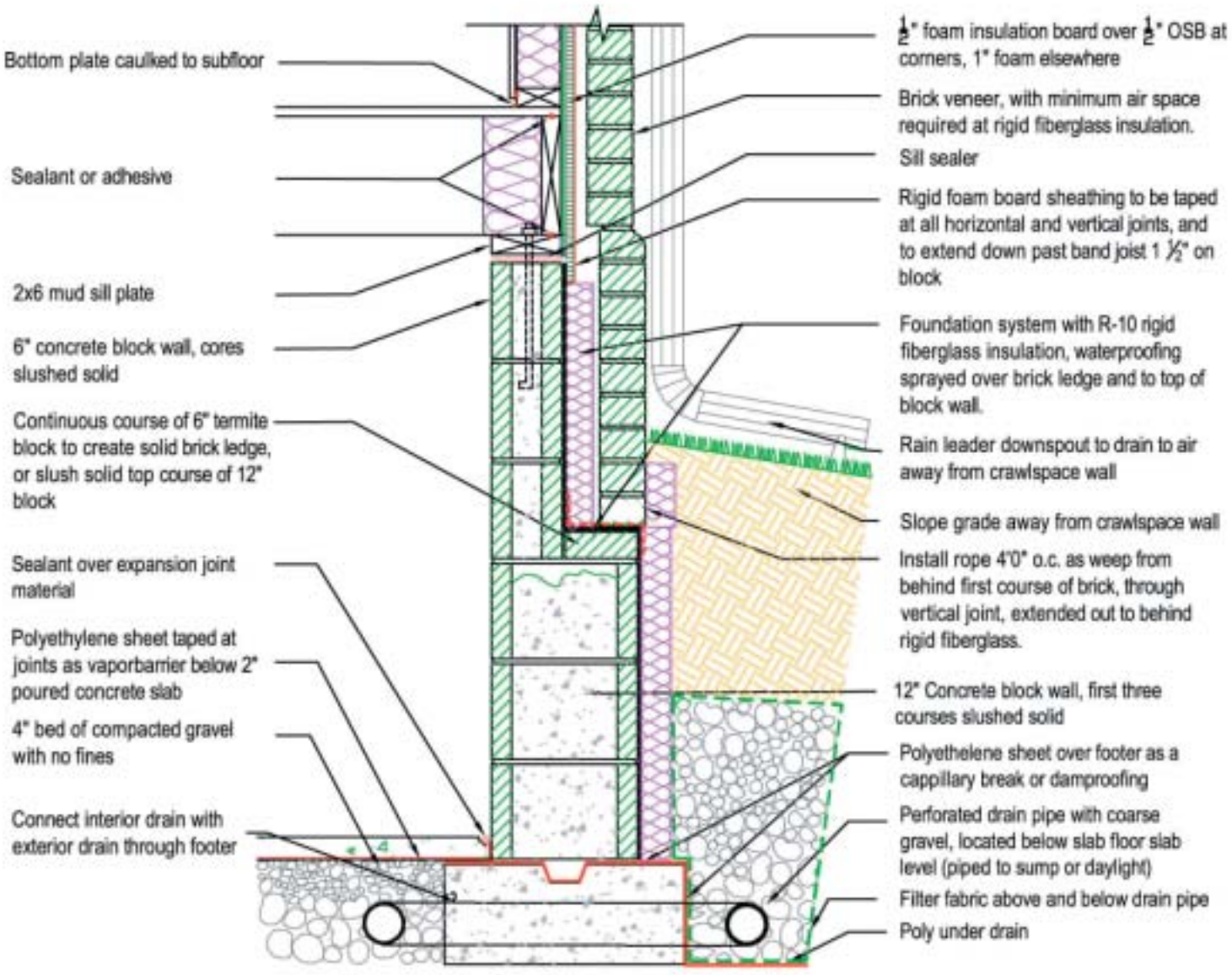
THE BOTTOM LINE

Will these improvements increase construction costs? Probably not. You can save money when replacing under-floor insulation with wall insulation, because the square footage of crawlspace walls is typically significantly less than the square footage of the first floor. The required insulation R-value is generally lower for crawlspace walls than what is required for floors. Treating the crawlspace as an unvented conditioned space also eliminates the cost of insulating ductwork and water lines.

While this type of approach may not currently be allowed by the letter of the code in many areas, the 2000 International Building Code allows unvented conditioned crawlspaces (see section 1202.3.2, # 4). Many builders have gotten permission by showing their code officials that what they are proposing isn't actually a crawlspace—it is just a really short basement!

NON-VENTED

Crawlspace Foundation System



THIS DETAIL SHOWS THE BEST PRACTICE FOR NONVENTED CRAWLSPACE FOUNDATION SYSTEMS.